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[redacted] 25X1A

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SPECIFICATIONS FOR LOW VOLTAGE SWITCHGEAR

8 NOV 1968

SWITCHGEAR FOR [redacted] TRANSMITTER NOT YET UNDER PROCUREMENT. THIS SPEC IS TYPICAL AND THIS, OR ONE VERY SIMILAR, WILL BE USED. 25X1A

SPECIFICATIONS FOR LOW VOLTAGE SWITCHGEAR

1. SCOPE

1.1 This specification covers several low voltage switchgear systems which will function primarily as an automatic transfer and control system between a commercial power source and one or more diesel driven generators. The actual capacities and operating parameters will be covered in the attachments.

2. APPLICABLE PUBLICATIONS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein.

SPECIFICATIONS

MIL-B-131	Barrier material, waterproof, flexible heat-sealable.
MIL-C-104	Crates, wood; lumber and plywood sheathed, nailed and bolted.
MIL-P-116	Preservations, method of.
MIL-W-76B	Wire

2.2 Other Publications - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN STANDARDS ASSOCIATION

C39.1	Instruments
C37.19	Power Switchgear
C57.13	Instrument Transformers

NATIONAL BUREAU OF STANDARDS

H-28 Screw Threads

NEMA STANDARDS

EI #1 Instruments

WC #1 Wires

SG-5-1959 Assemblies, power

3. GENERAL DESCRIPTION

The switchgear shall be totally enclosed, self-ventilated, dead front, self-supporting, floor mounted cabinet type consisting of one or more units not to exceed 30" W X 48" D X 91" H each bolted together and mounted on a common floor channel. Sheet steel not less than 1/8" will be used for fabrication. Hinged front doors with continuous hinges and removable back and side panels will be used. All operating controls, instruments, lamps, etc., shall be flush mounted on the hinged front doors and be externally visible and operable. All equipment shall be mounted in the cabinet in such a manner that each item may be separately removed from the front of the cabinet and replaced without interference to or removal of other equipment or connections. The cabinets shall include all necessary breakers, breaker controls, relays, timers, resistors, transformers, rectifiers, switches, pushbuttons, lamps, instruments, etc. to control the switchgear as specified in the attachments. All external connections shall terminate at terminal blocks or breaker lugs. Space shall be provided for top or bottom entrance of all power and control wiring. All aprts shall be accessible from the front and rear.

4. GENERAL REQUIREMENT

4.1 General - The units shall be assembled by a firm regularly engaged in the manufacturing of power switchgear. The bidder shall submit with his bid, information as outlined under 4.1.1 below. BIDS UNACCOMPANIED BY SUCH DATA will be rejected. Only items manufactured by the approved manufacturers as listed herein will be used. No prototype or non-standard items will be used. All equipment and devices must be in common use and have spare parts readily available. The equipment described in the bid information will be evaluated for compliance with the specification on the information submitted, and if found not to comply with the requirements of the specifications will be rejected. In event of conflict between the offeror's literature and this specification discovered after award, this specification will control and establish the contract requirement.

4.1.1 Descriptive Literature - Catalog data, sketches, and other pertinent information required to show the general arrangement and adequacy of the equipment shall be submitted with the bid. If the bidder submits drawings and/or standard published descriptive data of his product with the intention of making modifications to meet the requirements of the specification, the proposed changes shall be fully described in the submittal.

5. MATERIALS AND WORKMANSHIP

5.1 General - All materials and parts comprising each unit shall be new, of current manufacture, and of high grade free from all defect and imperfections. Workmanship shall be in accordance with good modern industrial practices. The contractor shall furnish to the contracting officer for his approval a list of the manufacturers of all machinery and other equipment which he contemplates using in his work. Equipment, material and articles installed or used without such approval shall be at the risk of subsequent rejection.

5.2 Protection Against Corrosion - All exposed items such as bolts, screws, nuts, washers, and other small parts shall be of an approved corrosion resisting material, or shall be suitably treated to resist corrosion.

5.2.1 Corrosion Resistant Treatment - A uniform coating of sufficient thickness of cadmium, chromium, copper, nickel, silver, or zinc is approved corrosion resisting treatment.

5.3 Dissimilar Metals - Contact between dissimilar metals which would cause deterioration of parts by galvanic corrosion shall be avoided wherever practicable.

5.4 Threaded Parts - All screw threads shall be in accordance with the National Bureau of Standards Handbook H. 28.

5.5 Drawings - The contractor shall furnish the contracting officer or his agent, a complete set of reproducible drawings not larger than 24" x 36" within 60 days after award of the contract of the following:

Overall dimensions including foundation plan, cable entrance location, and location of all instruments and devices mounted on front panels.

Schematic AC and DC diagrams including single line schematic.

Wiring diagrams including the location of all external connection points and interconnecting wiring.

Interconnecting diagrams to be coordinated with drawings of generating equipment which will be supplied the contractor.

6. OPERATIONAL REQUIREMENTS

6.1 Sequence of Operation - Each unit will be designed to operate in accordance with the attached sequence of operation and single line drawing.

6.2 Wiring - All control wiring will be MIL Spec. W-76B, Type HW-C14(30)U, 600 volt insulation. All conductors will be identified between connection points and so referenced on drawings. Markers shall be Mylar construction rated at 130°C. Pressure type lugs will be used which grip the insulation as well as the conductor of the wire. No solder connections will be used. Conductors used to span hinged panels shall be 41 strand extra flexible wire.

6.3 Instruments - All instruments shall be of the semi-flush mounted 4 1/2" square with 250 degree normal scale designed specifically for switchgear use. Instruments shall have an accuracy of 1 percent of full scale value. Moving elements shall be provided with zero adjustments readily

accessible from the front of the instrument without disassembly. All instruments shall be designed for the voltage and frequency specified, and shall be calibrated for the intended purpose and contain non-glare glass. Scale divisions shall be such as to facilitate rapid, accurate readings.

6.3.1 Acceptable Manufacturers - Only Westinghouse or General Electric equivalent switchboard meters will be used. Taut band suspension designed meters will be used wherever possible.

6.4 Instrument Transformers - Instrument transformers shall be indoor type designed and manufactured by the maker of the instrument with which they are to be used and will be constructed in accordance with ASA standards for instrument transformers, pub. No. C57-13. Mechanical and electrical ratings shall be coordinated with other apparatus in the switchgear in accordance with NEMA Standards for Power Switchgear Assemblies, publication No. SG-5.

6.5 Controls - Controls such as pushbuttons, switches, relays, timers, lampholders, etc. will be manufactured by one or more of the following manufacturers.

Cutler Hammer
Westinghouse
General Electric
Potter Brumfield
Allen Bradley
Dialco
Amphenol

All lamps will have push to test feature and control relays will be totally enclosed.

6.6 Control Source - The operating power for the control of all relays, lamps, and breakers will be from a nickel cadmium battery bank which will be considered part of the switchgear and contain all necessary charging/floating equipment to maintain the batteries at full capacity. This battery bank shall have a life expectancy of at least five years. In addition to control operation, the battery bank must have additional capacity to operate 3 ea. 50 watt lamps for switchgear lighting.

6.7 Circuit Breakers - Circuit breakers shall be ambient temperature compensated. Distribution breakers shall conform to NEMA Standard AB-1 and be provided with suitable lugs to receive load feeder cables. Generator, incoming commercial power, and bus tie breakers will be Westinghouse type DB electrically controlled and will use the manufacturer's drawout cells or assemblies and other accessory equipment.

6.8 Bus - The bus system will consist of 98% or higher conductivity bare copper, silver plated rated in accordance with the attached sequence of operation.

7. NAMEPLATES

Nameplates shall be provided for identification of all control switch functions, instruments, meters, breakers, and relays. Nameplates shall be of laminated plastic with engraved white letters on a black background, attached with screws.

8. FINISH

All metal surfaces forming a part of the switchgear will be cleaned, treated and painted with a rust resisting primer coat to provide a bond between the paint and the metal surface. Following the application of the primer coat, the switchgear shall be given a finish coat of Fed. Spec. 595 Color 26176 gloss grey. Surfaces will be finished by the spray method.

9. MANUFACTURER'S NAMEPLATES

Original manufacturer's nameplates or identifying tags will not be altered or removed.

10. FACTORY TESTS AND INSPECTION

The following tests shall be conducted at the contractor's plant and three certified copies of the test report shall be furnished to the inspecting officer. If the tests meet all requirements of the specification the units so tested will be approved for shipment. The contracting officer shall be notified of readiness for inspecting at least 10 days prior to the time of testing. All factory testing and inspecting to assure satisfactory operation of the units shall be witnessed by an authorized representative of the contracting officer. The manufacturer shall provide all necessary equipment, labor and instruments to perform the tests. Inspections may be conducted throughout fabrication of the units to confirm that the highest quality

of workmanship has been maintained and that all conditions of the specification are being met. The contractor shall submit for approval a complete testing procedure to be conducted on the units prior to beginning factory tests. The Government reserves the right to witness all tests unless waived in writing.

10.1 Preliminary Tests - All units will be given individual tests where applicable to assure satisfactory operation of components.

10.2 Dielectric Tests - The main circuits shall be given a dielectric test of 2200 volts for one minute between live parts and ground and between opposite polarities. The wiring of the control circuits shall be given a dielectric test of 1500 volts for one minute between live parts and ground.

10.3 Operational Tests - The complete switchgear, including remote panel and dummy load, shall be tested for operation under simulated service conditions to assure satisfactory operation of all controls and devices.

10.4 Additional Tests - Additional tests as considered necessary to determine the operation and adequacy of the units to meet the specifications may be required. Such tests will be determined by the inspecting officer.

11. INSTALLATION REQUIREMENTS

Installation of each unit will be by others in accordance

with construction drawings. The contractor is required to furnish information for proper installation. Note Para 5.5.

12. PACKING AND CRATING

Unless otherwise noted in the invitations for bids, all equipment shall be packed in accordance with the standard practice for domestic shipment via common carrier.

13. INSTRUCTION BOOK AND PARTS LIST

The contractor shall furnish four, contracting officer approved, instruction books per unit. Two books shall be included with each unit and two copies given to the inspecting officer. The installation instructions shall be bound into book form and give all the necessary information to put the unit into operation. The book shall also contain a complete section relative to alignment and calibration of all relays, breakers, timers and other controls and hints on servicing which might be of value to electricians. Complete instructions will also be included for the procedure for disassembling and reassembling all parts which require removal for initial installation or during routine maintenance. This book shall show the original manufactures part numbers in addition to any numbers which the contractor may also assign. All items and components will be covered by the manufacturers standard printed illustrative bulletins. Usually such bulletins cover all parts of a series of which

the accessory is a part, therefore, it will be necessary for the contractor to prefix such bulletine with a list of only those parts which comprise the accessory furnished. Complete nameplate data shall be given for all equipment having nameplates.

13.1 Arrangements - The instruction book shall be arranged in the following order:

a. Front Cover - The front cover shall contain essentially the manufacturers description and model number.

b. Table of Contents

c. Pertinent Data - This shall consist essentially of the nameplates data of all major equipment.

d. Illustrations - This will consist of photographs, minimum size 4" x 5" and illustrative drawings.

e. General Description - This paragraph shall contain a brief description of the equipment as a whole, including the general mechanical construction and the basic principals upon which the units operate.

f. Installation - The text should cover complete installation instructions and procedures.

g. Theory of Operation - The text of this section shall cover the description of the circuits and describe how they work. (Sequence of operation)

h. Maintenance and Overhaul - This section shall include all information necessary to permit technicians to

locate troubles, perform maintenance and make adjustments.

i. Parts List - This section shall contain a complete list of parts with the original manufacturer's part number as well as any numbers assigned by the contractor.

j. Drawings - Include a complete set of drawings, ref. para. 5.5.

k. Guarantee - The contractual guarantee clause covering the equipment shall be incorporated.

14. SPARE PARTS

The contractor will supply a 100% set of spare fuses and pilot lamps. If more that six control relays are used of one specific type a spare relay will be provided.

15. ERRORS AND OMMISSIONS

The contractor will not be allowed to take advantage of any errors or ommissions in the specification discovered after award and full instructions will be given by the contracting officer should any errors or ommissions be discovered.

16. GUARANTEE

All equipment shall be guaranteed against defective materials, design and workmanship for a period of one year from date of final acceptance. Upon receipt of notice from the Government of failure of any part during the guarantee period, the affected part or parts shall be replaced promptly with new parts by and at the expense of the manufacturer. Return of the damaged item will be at the discretion of the contracting officer or his agent.

ATTACHMENT TO SPECIFICATION 67-03

SYSTEM 01-67

1.0 DESCRIPTION

A multi bus system fed by commercial power, auto-start diesel generators and facilities for adding an uninterrupted power supply (UPS) at a future date. A split local distribution will be provided with a voltage regulator supplying the technical bus. Incoming commercial power, generator and UPS breakers will be electrically operated, interlocked, and provided with all necessary controls to permit the unit to function in accordance with the following sequence of operation and attached single line drawing. The commercial power breaker to the UPS motor and the feeder breakers to the UPS panel will utilize the control power of the switchgear but will be controlled by the UPS circuitry. Operation voltage will be 120/208 3 Ø 4 wire 50 cycle. All buss will be 800A min capacity.

2.0 SEQUENCE OF OPERATION

2.1 Normal Operation

2.1.1 Commercial breakers closed to both buses.

2.1.2 Generator breakers open and auto-start generators in stand-by condition.

2.2 Failure

2.2.1 In event voltage on any phase or frequency on a single phase falls below a pre-set adjustable level

(90% dropout 95% pickup) and remains there for an adjustable period of time (0-10 sec), the commercial line breakers to both buses will open and both generators signalled to start.

2.2.2 The first generator that comes up to frequency and voltage will close its breakers to the technical bus, the second generator will then close its breaker to the utility bus.

2.3 Return to Normal - Manual

2.3.1 After the commercial power has returned to the pre-set pick-up point and remains there for 0-30 min (adjustable) a lamp will light on the switchgear and on the remote panel. A momentary switch may then be depressed on the switchboard or remote panel which will open the generator breakers, close the commercial breakers to both buses, and cause the generators to shut down.

2.4 Return to Normal - Automatic

2.4.1 After the commercial power has returned to the pre-set pick-up point and remains there for 0-30 min (adjustable) the generator breakers will be opened, the commercial breakers to both buses will close, and the generator will be signalled to shut down.

2.5 Manual Operation

A selector switch will incorporate a manual position which will permit the manual (electric) operation of the commercial and generator breakers.

2.6 Interlock

Electric interlock will be provided on commercial, generator, and the feed breakers to the UPS panel to prevent closing commercial power with a generator or allowing the UPS generator to be paralled with the bus while the selector switch is in automatic position.

3.0 INSTRUMENTS AND CONTROLS

Consisting of but not limited to the following items.

Power Factor meter

Frequency meter 45-55 hz

Kilowatt hour demand meter with 15 min demand register

Ammeter 0-1000A

Ammeter switch 3 phase 5 pos. OFF-1-2-3-N

Voltmeter 0-300V

Voltmeter switch 3 phase 5 pos. OFF-1-2-3-N

Indicating light, commercial breaker position, green - open, red - closed.

Indicating light, commercial power available, yellow.

Switch momentary, return to normal

Switch selector, return to normal AUTOMATIC - MANUAL

Breaker, commercial to bus 1

Breaker, commercial to bus 2

Breaker, commercial to UPS space and terminals less breaker

Voltage and frequency sensing controls

3.2 Generator

Reverse power relay

Voltage and frequency sensing controls

Breakers, generators to bus 1

Breakers, generators to bus 2

Breakers, generators to dummy load

Indicating lamps, breaker positions red - closed, green - open

Selector switch, control to include OFF - AUTO

Indicating lamp, engine running, blue

Battery charger and Nicad battery equipment

3.3 Regulator

Voltmeter, regulated output

Voltmeter switch, 3 phase 5 pos. OFF-1-2-3-N

Voltage adjust controls

4.0 DISTRIBUTION AND REGULATION

4.1 Voltage Regulator

A Superior Elec Mod EMS62135Y voltage regulator will be installed and made part of this switchgear. Power from the technical bus will feed the regulator through a breaker and the regulated output will feed the technical load bus.

4.1.1 Regulator By-Pass

Provisions will be included to by-pass the voltage regulator with suitable jumpers or bus tie straps which will be included.

4.2 Distribution

4.2.1 Utility Bus

1ea Breaker, moulded case 600A, 3 pole marked "A.C. Panel".

1ea Space only, 600A frame

4.2.2 Tech. Bus

2ea Breaker, draw out type, 400A, 3 pole one fed from Tech bus, one with lugs only for connection to UPS generator. Outputs bussed and lugs provided to feed No-Break panel. Breakers electrically interlocked, with all controls, indicating two NO and two NC auxiliary contacts per breaker brought to terminal points for connection to UPS switchgear.

6ea Breaker, 15A 3 pole moulded case, marked "GEN ROOM CIRCUITS"

1ea Breaker, 400A 3 pole moulded case, marked "TECH PANEL"

1ea Breaker, space only

5.0 REMOTE PANEL

A remote panel totally enclosed, surface mount will be provided containing the following items and be of the enclosed type with suitable terminals and conduit fittings for connection to the main switchgear.

Frequency Meter 45-55 hz

Voltmeter 0-300V

Voltmeter switch, 3 phase 5 pos. OFF-1-2-3-N

Indicating light, commercial power available, yellow

Indicating light, generator running, blue

Indicating light, generator failure, red

Indicating light, no-break failure, red

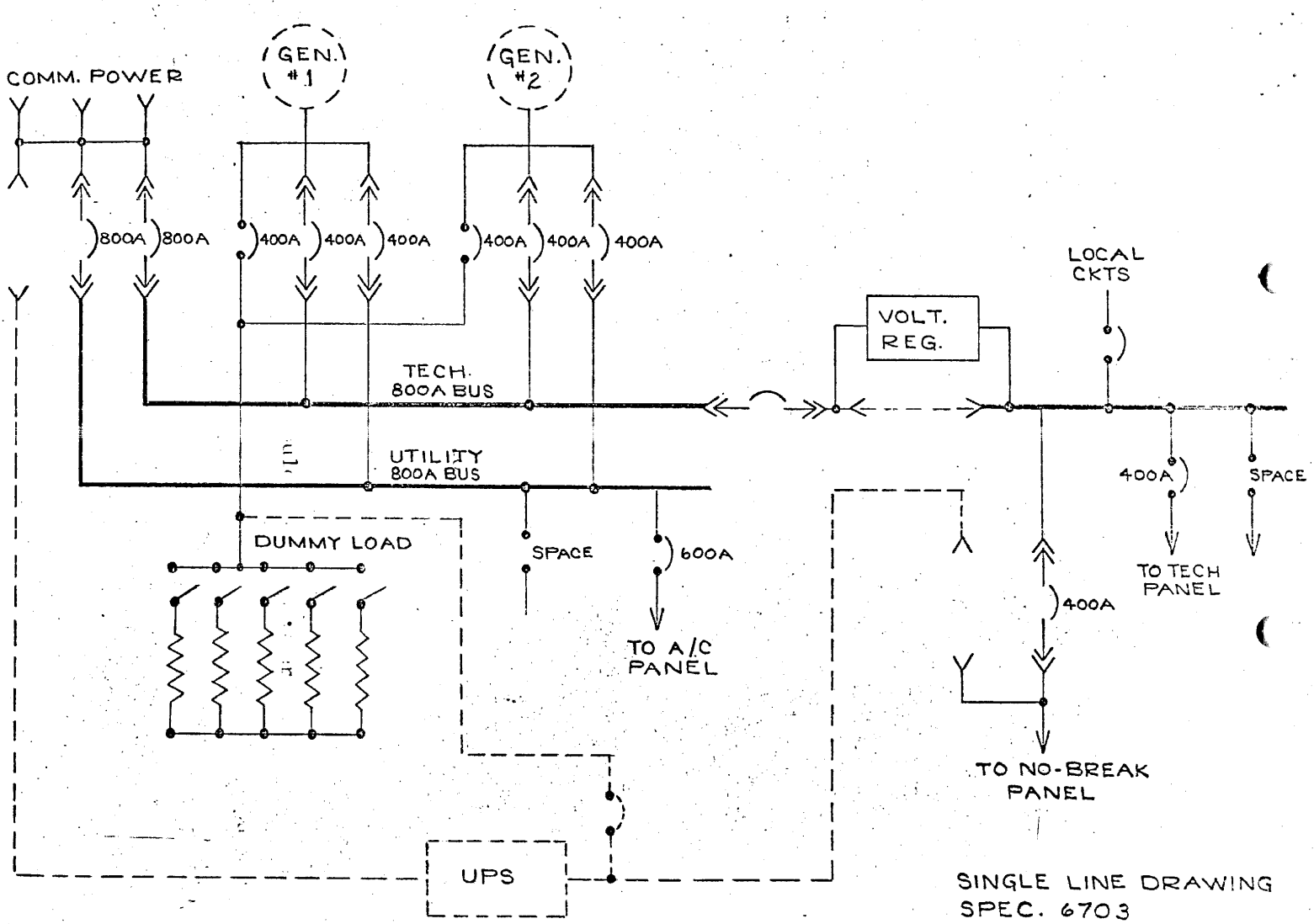
Indicating light, power breaker position, green - open, red - closed.

Alarm, engine failure with automatic silencing after 30 sec and automatic reset.

Switch, momentary, return to normal

6.0 LOAD BANK

A load bank for remote location will be provided and fed from each generator with moulded case breakers in the switchgear. A resistive type, forced air cooled of 250 KW capacity in 50 KW switched steps. Unit to be self-contained, suitably protected and designed for outdoor installation.



SINGLE LINE DRAWING
SPEC. 6703
SYSTEM 01-67

ATTACHMENT TO SPECIFICATION 6703

SYSTEM 02-67

1.0 DESCRIPTION

A split bus system fed by commercial power and two 100KW auto-start diesel generators to separate buses which will hereafter be refered to as Bus # 1 and Bus # 2. Bus # 1 will be the preferred bus. Provisions will be incorporated for adding a third 100KW generator, automatic synchronizing, and load control at a future date. All wiring to be included in the switchgear shall permit these additions without exchanging major components. Commercial power and generator breakers will be electrically operated, interlocked, and provided with all necessary controls to permit the unit to function in accordance with the following sequence of operation and attached single line drawing. Operating voltage will be 220/380 3 phase 4 wire 50 cycle.

2.0 SEQUENCE OF OPERATION

2.1 Normal Operation

2.1.1 Commercial line breakers closed to both buses.

2.1.2 Generator breakers open and pre-selected auto-start generators in stand-by condition.

2.2 Failure

2.2.1 In the event voltage on any phase or frequency on a single phase falls below a pre-set adjustable level (90% dropout 95% pickup) and remains there for an adjustable period

of time (0-10sec), the commercial line breakers to both buses will open; the generators will be signalled to start and will close their breakers to the buses in accordance with the position of the selector switch.

2.2.1.1 Gen 1 to Bus 1 and 2 position, Gen 1 will start and close its breakers to Bus 1 and 2.

2.2.1.2 Gen 2 to bus 1 and 2, Gen 2 will start and close its breakers to bus 1 and 2.

2.2.1.3 Gen 1 to bus 1 and Gen 2 to bus 2, Gen 1 will start and close its breaker to bus 1. Gen 2 will start and close its breaker to bus 2.

2.2.1.4 Gen 1 to bus 2 and Gen 2 to bus 1, Gen 1 will start and close its breaker to bus 2. Gen 2 will start and close its breaker to bus 1.

2.2.1.5 Auto - synch, both generators will start, automatically synchronize and close to both buses.

2.2.2 Failure of a generator supplying bus 1 will cause its breaker to bus 1 to open, the remaining generator to start and/or open its breaker to bus 2 and close its breaker to bus 1. Bus 2 will be left dienergized.

2.3 Return to Normal - Manual

2.3.1 After the commercial power has returned to the present pick-up point and remains there for 0-30 min (adjustable) a lamp will light on the switchgear and in the remote panel. A momentary switch may then be depressed on the switchgear or remote panel which will open the generator

breakers, close the commercial breakers to both buses and cause the generators to shut down.

2.4 Return to Normal - Automatic

2.4.1 After the commercial power has returned to the pre-set pick-up point and remains there for 0-30 min (adjustable), the generator breakers will open, the commercial breakers to both buses will close, and the generators will be signaled to shut down.

2.5 Manual Operation

A selector switch will incorporate a manual position which will permit the manual (electric) operation of the commercial and generator breakers.

2.6 Interlock

Electric interlock will be provided between the commercial and generator breakers to prevent the automatic paralleling of any generator with commercial power.

3.0 INSTRUMENTS AND CONTROLS

Consisting of but not limited to the following items.

3.1 Commercial Power

Power Factor meter

Frequency meter 45-55 hz.

Kilowatt hour demand meter with 15 min demand register

Ammeter 0-1000A

Ammeter switch 3 phase 5 pos. OFF-1-2-3-N

Voltmeter 0-500V

Voltmeter switch 3 phase 5 pos. OFF-1-2-3-N

Indicating lights, commercial and generator breaker positions, green - open, red - closed

Indicating light, commercial power available, yellow

Switch, momentary, return to normal

Switch, selector, return to normal. 2 pos. AUTOMATIC - MANUAL

Breaker, commercial to bus 1

Breaker, commercial to bus 2

Voltage and frequency sensing controls

3.2 Generator

Reverse power relay

Voltage and frequency sensing controls

Breaker, generators to bus 1

Breaker, generators to bus 2

Breaker, future gen to bus 1, space and terminals only

Breaker, future gen to bus 2, space and terminals only

Indicating lamps, breaker position, red - closed, green - open

Indicating lamp, engine running, blue

Indicating lamp, engine failure, red

Selector switch, control, to include OFF-MANUAL 1-2, 1-3, 2-3

or

Battery charger and Nickel Cadmium battery equipment

4.0 DISTRIBUTION

4.1 Bus 1

1ea 225A, 3 pole

1ea 50A, 3 pole

2ea Space only 100A

4.2 Bus 2

2ea 175A, 3 pole

1ea 100A, 3 pole

1ea 50A, 3 pole

1ea 30A, 3 pole

2ea Space 100A, 3 pole

2ea Space 30A, 3 pole

5.0 REMOTE PANEL

A remote panel totally enclosed, surface mount will be provided containing the following items ~~and be of the enclosed type~~ with suitable terminals and conduit fittings for connection to the main switchgear.

Frequency meter 45-55 hz

Voltmeter 0-500V

Voltmeter switch 3 phase 10 pos. bus 1

(OFF-1-2-3-N) bus 2 (OFF-1-2-3-N)

Indicating light, commercial power available, yellow

Indicating light, generator running, blue

Indicating light, generator failure, red

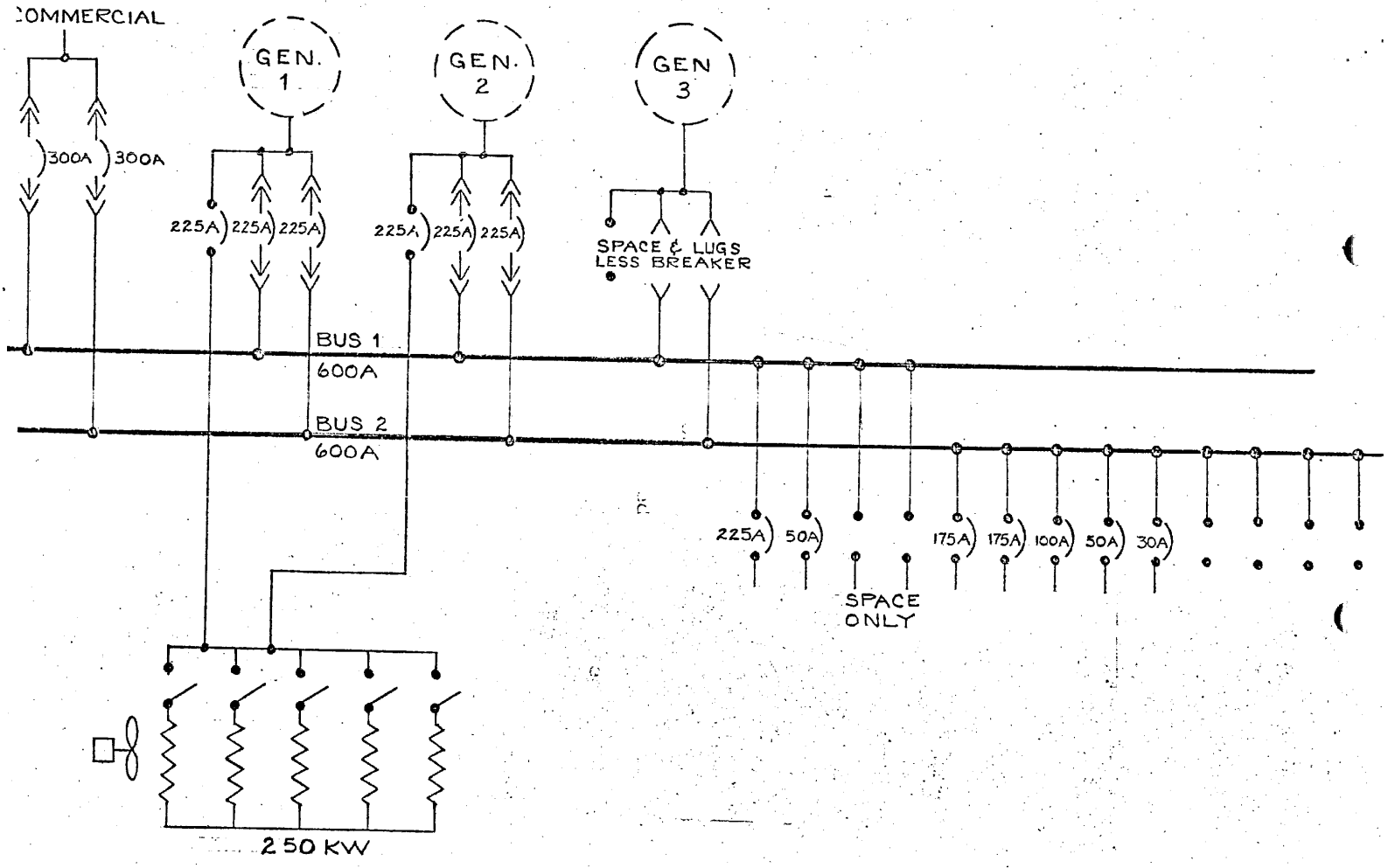
Indicating lights, generator and commercial power breaker position, red - closed, green - open

Alarm, engine failure with silencing after 30 sec with automatic reset.

Switch, momentary, return to normal

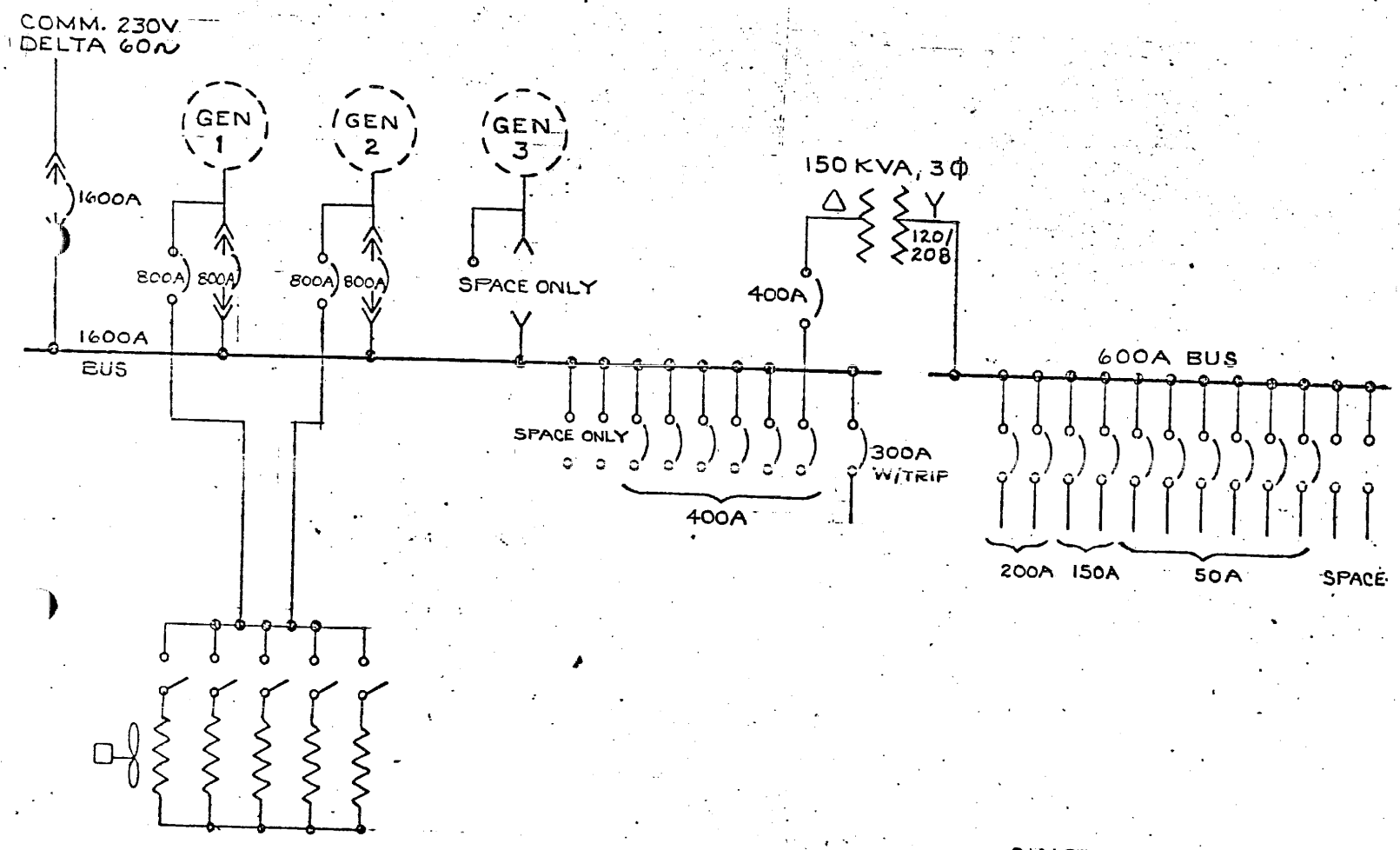
6.0 LOAD BANK

A load bank for remote location will be provided and fed from each generator with moulded case breakers in the switchgear. A resistive type, forced air cooled unit of 250KW capacity in 50KW switched steps will be used. Unit to be self contained suitably protected and designed for outdoor installation.



SINGLE LINE DRAWING
SPEC. 6703
SYSTEM 02-67

Approved For Release 2000/06/06 : CIA-RDP78-06505A000400010003-9



SINGLE LINE DRAWING
SPEC 6703
SYSTEM 03-67

ATTACHMENT TO SPECIFICATION 6703

SYSTEM 03-67

1.0 DESCRIPTION

A split bus system fed by commercial power and two 250 KW auto-start diesel generators with provisions for adding a third unit at a later date. Commercial power and generator breakers will be electrically operated, interlocked, and provided with all necessary controls to permit the unit to function in accordance with the following sequence of operation and single line drawing. Incoming commercial and generator power will be 230 Volt 3 phase delta 60 cycle. A self contained 150 KVA dry transformer will be fed from the delta bus to a separate 120/208 three phase four wire distribution bus.

2.0 SEQUENCE OF OPERATION

2.1 Normal Operation

2.1.1 Commercial line breaker closed to bus.

2.1.2 Generator breakers open and pre-selected auto-start generator in stand-by condition.

2.2 Failure

2.2.1 In the event voltage on any phase, or frequency on a single phase, falls below a pre-set level (90% dropout 95% pickup) and remains there for an adjustable period of time (0-10 sec), the commercial power breaker will

open; the generator signalled to start and its breaker closed onto the bus as soon as it reaches operating speed and voltage.

2.2.2 Failure of the pre-selected generator to start or subsequent failure will cause its breaker to open and the remaining generator signalled to start and close its breaker to the bus provided its control switch is in the "AUTOMATIC" position.

2.3 Return to Normal - Manual

2.3.1 After the commercial power has returned to the pre-set pick-up point and remains there for 0-60min (adjustable) a lamp will light on the switchgear and remote panel. A momentary switch may then be depressed on the switchgear or remote panel which will open the generator breaker, close the commercial breaker and signal the generator to shut down.

2.4 Return to Normal - Automatic

2.4.1 After the commercial power has returned to the pre-set pick-up point and remains there for 0-60 min (adjustable), the generator breaker will open, the commercial breaker close and the generator signalled to shut down.

2.5 Manual Operation - A selector switch will incorporate a manual position which will permit the manual (electric) operation of the commercial and generator breakers.

2.6 Interlock - Electric interlock will be provided between the commercial and generator breakers to prevent

the automatic paralleling of any generator with commercial power.

3.0 INSTRUMENTS AND CONTROLS

Consisting of but not limited to the following items.

3.1 Commercial Power

Power Factor meter

Frequency meter 55-65 cps.

Kilowatt hour demand meter with 15 min. demand register

Ammeter 0-1600 A

Ammeter switch 3Ø 4 pos, OFF-1-2-3

Voltmeter 0-300V

Voltmeter switch, 3Ø 4 pos, OFF-1-2-3

Indicating lights, commercial breaker position, red - closed, green - open

Indicating light, commercial power available, yellow

Indicating lights, ground fault, white

Switch, momentary, return to normal

Switch, selector, return to normal, 2 pos, Automatic-Manual

Voltage and frequency sensing controls

Breaker, commercial to bus, 1600A

3.2 Generator

Reverse power relays

Voltage and frequency sensing controls

Breaker, generator 1 to bus 1600A

Breaker, generator 2 to bus 1600A

Breaker, generator 3 to bus, space and terminals only, less breaker

Breaker generator to load bank, moulded case

Indicating light, breaker position, red - closed, green - open

Indicating light, generator running, blue

Indicating light, engine failure, red

Selector switch, to include OFF-MANUAL, 1-2-3, 2-3-1, 3-1-2

Battery charger and Nickel Cadmium battery equipment

4.0 TRANSFORMER

A 150 KVA 3Ø dry type transformer will be installed as part of the switchgear. Primary will be connected to a moulded case breaker on the 3Ø 3W distribution section. The 120/208 3Ø 4W secondary will be connected to the 4 wire distribution section.

5.0 DISTRIBUTION

5.1 240 Volt Delta

Breaker, MA frame 400A 3 pole 6 ea

Breaker, MA frame 3 pole space only 2 ea

Breaker, MA frame 300A, 3 pole with undervoltage trip 1 ea

5.2 120/208 Wye

Breaker, KA frame 200A, 3 pole 2 ea

Breaker, KA frame 150A, 3 pole 2 ea

Breaker, E frame 50A, 3 pole 6 ea

Breaker, KA frame, 3 pole, space only 2 ea

Breaker, E frame, 3 pole, space only 2 ea

6.0 REMOTE PANEL

A remote panel, totally enclosed and surface mount will be provided containing the following items with suitable terminals and conduit fittings for connection to the main switchgear.

Frequency meter 45-55 cps

Voltmeter 0-300V

Voltmeter switch 3 phase 9 pos.

Delta (OFF-1-2-3) WYE (OFF-1-2-3-N)

Indicating light, commercial power available, yellow

Indicating light, generator running, blue

Indicating light, generator failure, red

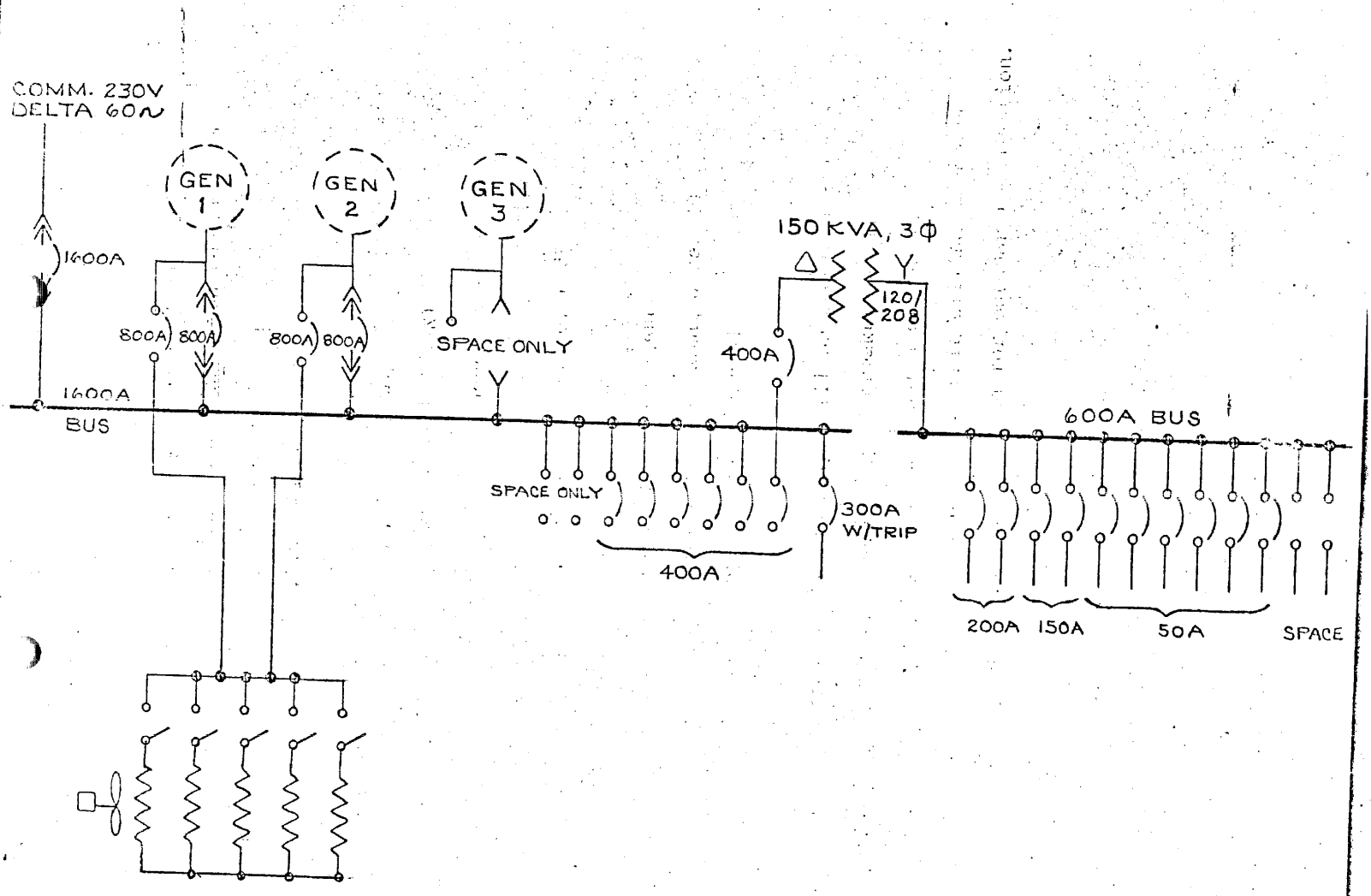
Indicating lights, generator and commercial breaker position, red - closed, green - open

Alarm, engine failure with silencing after 30 sec.

Switch, momentary, return to normal

7.0 LOAD BANK

A load bank for remote location will be provided and fed from each generator with moulded case breakers in the switchgear. A resistive type, forced air cooled of 250 KW capacity in 50 KW switched steps will be used. Unit will be self contained, suitably protected and designed for outdoor installation.



SINGLE LINE DRAWING
SPEC 6703
SYSTEM 03-67

SPECIFICATION NO. 6802

1 August 1968

Specifications for 250KW Diesel

Driven Generator Unit

8 NOV 1968

NOW BEING PROCURED FOR [redacted] TRANSMITTER. 25X1A

PROCUREMENT CONTRACT HAS BEEN AWARDED.

SPECIFICATIONS FOR DIESEL DRIVEN GENERATOR UNIT

1. SCOPE

1.1 This specification covers a diesel driven generator set which will be utilized to provide power in the event of failure of commercial power.

2. APPLICABLE PUBLICATIONS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal from a part of this specification to the extent specified herein.

SPECIFICATIONS

MIL-B-131	Barrier material, waterproof, flexible heat-sealable
MIL-P-116	Preservations, methods of
MIL-I-16910	Interference measurements, Radio methods and limits 14 kilocycles to 100 megacycles
MIL-W-76B	Wire

2.2 Other Publications - The following documents from a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN STANDARDS ASSOCIATION

C39.1	Instruments
C50.1	Synchronous machines
C37.19	Power Switchgear
C57.13	Instrument Transformers

NATIONAL BUREAU OF STANDARDS

H-28	Screw Threads

NEMA STANDARDS

MD #1	Motor and Generators
EI #1	Instruments
WC #1	Wires
SG 5-1959	Assemblies, power

3. GENERAL DESCRIPTION

3.1 Each set shall consist essentially of an AC generator, diesel engine and engine control mounted on a channel base. Capacity and operating characteristics shall be as specified herein. The set shall be complete, including engine starting control, generator control and all auxiliary equipment and controls. Each set shall include but not be limited to, the following items:

a. Liquid cooled diesel
b. Engine silencer and piping
c. Generator and exciter
d. Steel base
e. Engine instrument panel

f. Engine starting controls (auto-start)

g. Generator control unit

All rotating equipment of each set including diesel engine, coupling, and generator shall be mounted and carefully aligned on a rigid structural steel base capable of supporting all components and permitting handling and lifting into position without affecting the alignment of the equipment. All parts of the sets shall be readily accessible for operation, routine servicing, periodic maintenance, and repair. Servicing and periodic maintenance shall in general be capable of accomplishment with conventional engine mechanics and electricians tools and test equipment. Replacement and adjustment of components, assemblies, and accessories shall be possible with minimum drainage requirements and disturbance to other elements.

4. GENERAL REQUIREMENTS

4.1 General - The unit, complete with controls shall be assembled by a firm regularly engaged in the manufacturing of generator sets. The bidder shall submit with his bid, information as outlined under 4.1.1 below. BIDS UNACCOMPANIED BY SUCH DATA WILL BE REJECTED. No prototype on non-standard items will be used. All equipment and devices must be in common use and have spare parts readily available. The equipment described in the bid information will be evaluated for compliance with the specification on the information submitted, and if found not to comply with the requirements

of the specifications will be rejected. In event of conflict between offeror's literature and this specification discovered after award, this specification will control and establish the contract requirement.

4.1.1 Descriptive Literature - Catalogue data, sketches, and other pertinent information required to show the general arrangement and adequacy of the equipment shall be submitted with the bid. If the bidder submits drawings and/or standard published descriptive data of his product with the intention of making modifications to meet the requirements of the specification, the proposed changes shall be fully described in the submittal.

4.2 Specified Equipment - Proposed equipment shall include the following specified items:

Diesel Engine

Alternator

Voltage Regulator

Engine Governor

4.3 Equipment Not Included - The manufacturer will not be required to supply the following items.

Fuel tanks and piping beyond unit.

Foundation bolts

5. MATERIALS AND WORKMANSHIP

5.1 General - All materials and parts comprising the set shall be new of current manufacture, and of high grade free

from all defects and imperfections. Workmanship shall be in accordance with good modern industrial practices. The contractor shall furnish to the contracting officer for his approval a list of the manufacturers of all machinery and other equipment which he contemplates using in his work. Equipment, material and articles installed or used without such approval shall be at the risk of subsequent rejection.

5.2 Protection Against Corrosion - All exposed items such as bolts, screws, nuts, washers, and other small parts shall be of an approved corrosion resisting material, or shall be suitably treated to resist corrosion.

5.2.1 Corrosion Resistant Treatment - A uniform coating of sufficient thickness of cadmiun, chromium, copper, nickel, silver, or zinc is approved corrosion resisting treatment.

5.3 Dissimiliar Metals - Contact between dissimiliar metals which would cause deterioration of parts by galvanic corrosion shall be avoided wherever practicable.

5.4 Threaded Parts - All screw threads shall be in accordance with the National Bureau of Standards Handbook H.28.

5.5 Drawings - The contractor shall furnish the contracting officer or his agent, a complete set of reproducible drawings not larger than 24" x 36" within 60 days after award of contract of the following:

5.5.1 Rotating equipment and diesel engine on its base showing the outline of the unit; overall dimensions; base

mounting plan, including isolators; and the location and size of all external electrical connections, fuel oil connections, lube oil and coolant drains, and exhaust connections.

5.5.2 Outline dimensions of the control panels, conduit locations, location of controls, instruments, and terminal blocks, properly identified for connection of interconnection wiring.

5.5.3 Outline dimensions of the exhaust muffler and flexible connection.

5.5.4 Wiring diagrams including a schematic wiring diagram of the complete system showing the interconnecting wiring and terminal points between equipment. All drawings shall include a legend to fully describe all symbols used.

5.6 Safety - All exposed parts that operate at extremely high temperature or that are energized electrically, and all rotating or reciprocating parts that are of such nature or so located to become a hazard to operating personnel shall be insulated, fully enclosed, or properly guarded. Engine parts such as starting sheaves or exhaust manifolds shall be located insofar as it is practicable to minimize hazard to operating personnel. Such location or construction shall in no way impair the function of these components.

5.7 Vibration and Critical Speed - Each set shall be mounted on vibration isolators, between base and floor slab. The isolators shall reduce the vibration transmitted to the

adjacent floor slab to a maximum of 0.0015 inch total amplitude throughout the frequency range down to 66 cps during all phases of operation of the set. The contractor shall submit certified test data to the contracting officer or his agent and guarantee that the isolators furnished with the set reduce the vibration to or below the limits specified herein. The isolators will be secured to the floor by others in a manner prescribed by the contractor and detailed under paragraph 5.5.

6. OPERATIONAL REQUIREMENTS

6.1 Rating - The unit will be rated and guaranteed to deliver 200 KW at 1500 RPM .8 power factor lagging continuously with relative humidity of 20% and at an ambient temperature of 120°F at sea level, or at 70°F at an altitude of 8000 feet. The alternator will be three phase, twelve wire 50/60 cycle and be wired at delivery for 120/208 volts 60 cycle. Provisions and accompanying data will be supplied to allow the unit to operate on the following additional voltages with wiring changes only. 220/380, 277/480 and 240 delta.

6.2 Performance - At any constant load, .8 P.F. lagging, from no load to full load the voltage will remain within ± 3/4% rated voltage. Upon addition or rejection of full load the voltage will not rise or dip over 10%. Recovery time to the first cross over will be less than 1/2 second.

6.3 Engine Requirements - The diesel engine shall be a Detroit Diesel Model 12V-71N utilizing dual oil and fuel

filters and primary fuel strainer. Engine exhaust manifold will be of the end outlet type.

6.3.1 Starting Systems - Each engine shall be equipped with a 24 volt D.C. starting system consisting of starter motor, battery, contactors, cables, and all controls necessary for the specified operation. The battery will be of the lead-acid industrial type specifically designed for diesel starting service having a minimum capacity of 200 amp/hours at the 8 hour rate to a cell voltage of 1.75V. Batteries will be shipped dry charged and the electrolyte packed separately in accordance with the supplementary packing specifications.

6.3.1.1 Battery Charger - A battery charger specifically designed to charge and continuously float the batteries will be provided. Input voltage will be 115/230V 50/60 cycle and will be from two sources with automatic transfer within the charger to an emergency source. The emergency source will be from the output of the alternator and suitable connection points will be provided in the generator control cabinet. Charger will be suitably protected to prevent damage to the charger or cause its breaker to trip during engine cranking. Charger will be rated at maximum output of 15 amp. A dual scale ammeter will be provided to read both high and float rate of charge. A momentary switch may be utilized to read the low rate. The float rate will be adjustable. The charger will be designed for wall mounting. La Marche Mod. A40 Dwg. 893A is acceptable.

6.3.2 Automatic Start - Automatic starting controls shall be furnished to start and stop the engine from the remote control panel, generator control panel, or from a set of contacts within a typical automatic transfer switch, closing to start, opening to stop.

6.3.2.1 Engine Cranking Controls - Crank controls shall provide for a one minute crank period or equivalent cycle cranking. A speed sensing device shall automatically disconnect the starting circuit when the engine has reached approximately 700 RPM. If the engine has not started at the end of the starting program, the engine starting controls shall be locked out and no further starting attempt shall be permitted until the overcrank device has been manually reset. A signal light shall be provided on the generator control panel to indicate this condition. Governor dump valves will be utilized for engine shut-down.

6.3.2.2 Selector Switch - A selector switch shall be incorporated in the automatic start controls. It shall include an "OFF" position that prevents starting of the engine; a "manual" position that permits the engine to be started at the engine by the pushbutton on the engine control panel by-passing the auto controls; a "TEST" position which causes the engine to start through the automatic controls; a "REMOTE/AUTOMATIC" position which will allow the unit to be started from the remote panel or by a set of contacts in an automatic transfer switch having auxiliary contacts closing to start and opening to stop.

6.3.3 Cooling - The engine cooling system shall be a forced liquid cooled type employing a radiator and pusher type fan mounted intergral with the unit. Radiator shall be of the fin and tube type or stacked corrugated sheet type and constructed of copper. The radiator shall be of the size and capacity as recommended by the engine manufacturer to hold 75°F temperature differential and shall be provided with frame and supports for mounting. Radiator shall be of the pressure type incorporating a cap and filter. The radiator cap shall be designed for pressure relief prior to removal. The cooling system shall be capable of withstanding a pressure of at least 20 PSI. A filter shall be installed employing a replaceable element. The radiator fan shall be protected by a strong grill or screen guard and provisions for attaching an external duct shall be provided. The radiator shall incorporate a tapped hole not less than 3/8" NFT and shall be equipped with a drain cock at the lowest point.

6.3.4 Fuel System - The fuel system shall embody the following items counted on each engine.

6.3.4.1 Fuel Pump - The engine fuel pump shall be of the positive displacement engine driven type and shall be capable of supplying an adequate quantity of fuel from a circulating tank.

6.3.4.2 A high lift engine driven pump shall be installed with recirculating tank and all necessary items to supply fuel from a buried storage tank. This pump must be capable of

lifting fuel from 10 feet below the floor level in which the generator is mounted and in sufficient quantity to supply the engine at 120% rated capacity.

6.3.4.3 Priming Pump - A hand operated fuel oil priming pump shall be furnished and mounted adjacent to the fuel filters.

6.3.4.4 Fuel Filters - Fuel filtration, consisting of a strainer and dual microfilters shall be installed in the supply line from the recirculating tank.

6.3.5 Engine Governor - The engine governor shall be a Woodward Mod. PS-G with external droop control and governor control motor.

6.3.6 Engine Intake Air - The engine shall be equipped with a dry type air cleaner of sufficient capacity to permit full output of the engine over prolonged periods of time without excessive maintenance. The cleaner shall be mounted integral with the engine and be one specifically recommended by the engine manufacturer and be complete with all accessories including supports and restricted filter warning device.

6.3.7 Engine Wiring - All engine control wiring will be MIL Spec W-76B, type HW-C14(42)U, 600 volt insulation. All conductors will be identified between connection points and so referenced on drawings. Markers shall be of mylar construction rated at 130°C. Wiring to be enclosed in liquid tight flexible conduit consisting of a galvanized steel core with polyvinyl chloride cover. Terminations will be made into liquid tight boxes and all connections to devices will be

sealed liquid tight. Anaconda "Sealtite" type VA or equivalent is acceptable.

6.3.9 Engine Mounted Instruments and Control - Means shall be provided at the set to start and stop the engine when the selector switch on the generator control cabinet is in "MANUAL" position. In addition to engine controls, the panel shall contain the following instruments graduated as required below:

Instrument	Requirements
Lubricating oil pressure gauge	Graduated to read direct in lbs. per sq. in. Meter size 3" flush mount. Danger zone in red.
Coolant temperature gauge	Graduated to read direct in degree F. Meter size 3", flush mount.
Fuel pressure gauge	Graduated to read direct in lbs. per sq. in. Danger zone in red. 3" size, flush mount.
Tachometer, electric	Graduated to read direct in R.P.M.

The panel shall be shock mounted for the purpose of reducing the vibration to a value which will not cause damage or unnecessary wear to the instruments.

6.3.10 Engine Safety Controls - The engine shall be equipped with the following automatic safety devices and alarms.

6.3.10.1 Oil Pressure Alarm - A lubricating oil pressure switch shall light a lamp and ring an alarm on the generator control cabinet and remote panel on the approach of dangerously

low oil pressure. In event of dangerously low oil pressure, a switch shall shut the engine down and open generator breaker.

6.3.10.2 High Coolant Temperature Alarm - A high jacket water alarm switch shall operate to light a lamp and ring an alarm on the generator control cabinet and remote panel on the approach of high jacket water temperature. In event of dangerously high coolant temperature the switch shall shut the engine down and open the generator breaker.

6.3.10.3 Overspeed Alarm - The engine shall be equipped with an overspeed device which will shut the engine down in the event the speed exceeds 2050 RPM., sound an alarm and light a lamp on the generator control cabinet and remote panel and open the generator breaker.

6.3.10.4 Loss of Coolant - In the event of loss of coolant the switch shall shut the engine down, sound an alarm, light a lamp on the generator control cabinet and remote panel, and open the generator breaker. Provisions will be incorporated in this device to permit immediate restart of the engine after shutdown with any load up to and including 110% full load.

6.3.11 Flexible Connection - Flexible metallic connections of at least 18" long shall be furnished for the fuel oil terminal points on the set where connections are to be made to the building piping system. Flexible connections shall consist of bronze or stainless steel with annular corrugations, pressure tight, and shall be fatigue resistant under flexure or vibration. Fittings to attach 1/2" copper tubing will be supplied.

6.3.12 Base - The base shall be of the box type, constructed of structural steel and be rigid enough to insure permanent alignment during handling and shipping. The base shall be designed to permit the use of vibration isolators as specified herein. The engine-alternator shall be directly fastened to the base. Base will contain lifting attachments and be so arranged that when hoisted, adequate clearance will exist between lifting slings and all exterior parts of the set. A diagram showing the lifting attachments and lifting slings shall be inscribed on a copper base alloy plate securely fastened to the base with the lifting capacity of each attachment and the required length and size of each sling cable marked thereon. A silhouette of the generator set showing the center of gravity shall be included.

6.4 Generator - The generator will be a Delco Products Co. Mod. E5340MB single bearing, drip proof, brushless, high performance, 50/60 cycle rated no less than 250 KW at .8 PF 1800 RPM, 120/208; 220/380, 277/480, 240 delta, 3 phase 12 wire. Fungus proof varnish will be used.

6.4.1 Voltage Regulator - The voltage regulator will be a Delco Products Co. three transistor temperature compensated unit designed specifically for the alternator under 6.4, including cross current controls to permit parallel operation. A momentary field flashing switch shall be incorporated within the control cabinet to allow flashing the

generator fields. A protective diode will be included to prevent damaging the regulator from incorrect battery polarity.

6.5 Generator Control Cabinet - The generator control cabinet shall be of the totally enclosed free standing cabinet type, self ventilating, fabricated of sheet steel. Door hinge will be of the continuous type. The cabinet shall include all necessary breakers, controls, relays, timers, resistors, regulators, rectifiers, switches, lamps, pushbuttons, instruments, etc. to control the set as generally outlined. All external connections, except power leads, shall terminate at terminal blocks near the bottom rear of the cabinet. Power leads may terminate at the circuit breaker lugs. Space and openings shall be provided for bottom entrance of all cables. An interconnecting cable 25 ft. long neoprene covered, to interconnect all control circuits between the generator set and the control cabinet, except the generator power and field leads, will be supplied. Separate 25' generator power and field leads will be supplied. All parts shall be accessible from the front and rear of the cabinet. Control equipment shall conform to Underwriter's Laboratories Standard UL-508. All lamps except synchronizing lamps will have push to test feature and relays will be totally enclosed. The generator control cabinet shall consist of but not be limited to the following instruments and devices.

Control Switch - OFF-MAN-AUTO-TEST

Voltage regulator

Voltage adjust rehostat

Droop adjust rehostat

Var Meter

Voltmeter, 0-500V

Voltmeter switch, 5 pos. OFF-1-2-3-N

Ammeter Dual scale 0-500 & 0-1000 A w/switch

Ammeter switch, 5 pos. OFF-1-2-3-N

Kilowatt meter 0-300 KW

Frequency meter 45-65 HZ

Synchroscope

Synchronizing lamps

Synchronizing switch

Alarm with auto silencing after 15 secs.

Engine failure lamps

Emergency stop pushbutton

Running time meter 50 cycle 0-99999 hrs.

Running time meter 60 cycle 0-99999 hrs.

Switch running time meter selector 50 and 60 cycle

Switch, field flashing

Conveniency outlet 20A duplex w/ground, fused

Panel lamps and switch (24VDC)

Governor control raise-lower

Main circuit breaker

6.5.1 Wiring - All control wiring will be MIL Spec. W-76B, type HW-C14(42)U, 600 volt insulation. All conductors will be identified between connection points using mylar

type markers and referenced on drawings. Color coding is not required. Markers to match external connections will be furnished for all interconnecting wiring not supplied under this contract. Wiring terminations will be made using insulated pressure type lugs which grip the wire insulation as well as the conductor. No solder connections will be used.

6.5.2 Instruments - All instruments shall be of the semi flush mounted 4 1/2" rectangular with 250 degree normal scale conforming to NEMA Standard EI-1. Instruments shall have an accuracy of 1% of full scale. Moving elements shall be provided with zero adjustments readily accessible from the front of the instrument without disassembly. All instruments shall be designed for the voltage and frequency specified, and shall be calibrated for the intended purpose and contain non-glare glass. Scale divisions shall be such as to facilitate rapid, accurate readings. Only Westinghouse, or the equivalent General Electric switchboard meter will be used. Taut band suspension designed meters will be used wherever possible.

6.5.3 Control Source - The operating power for the control of lamps and relays shall be from the engine starting batteries.

6.5.4 Power Breaker - The main circuit breaker shall be a three pole, moulded case rated at 600V with temperature compensated thermal magnetic and shunt trip. Additional trip elements will be provided for the voltages specified under

6.1. Breaker will be provided with suitable lugs to receive load feeder conductors.

6.5.5 Nameplates - Nameplates shall be provided for identification of all control switch functions, instruments, meters and relays. Nameplates shall be of laminated plastic with engraved white letters on a black background, attached by screws.

6.5.6 Finish - All metal surfaces forming a part of the control cabinet will be cleaned, treated and painted with a rust resisting primer coat to provide a bond between the paint and the metal surface. Following the application of the primer coat, the cabinet shall be given a finish coat of Fed. Spec. 595, Color 26176 gloss grey. Surface shall be finished by the spray method.

6.6 Remote control panel - A remote control panel of the totally enclosed wall mounting type will be supplied under this contract and will contain, but not be limited to the following items.

Indicating lamp, engine failure, red

Alarm with automatic silencing after 15 sec.

Indicating lamp, commercial power available

Engine running lamp, yellow

Remote start-stop switch

Frequency meter 45-65 cps

Voltmeter 0-500V

Voltmeter switch 10 pos. GEN (OFF-1-2-3-N)
(COMM (OFF-1-2-3-N

Terminal points will be provided to facilitate the interconnection between the remote panel and control cabinet.

7. FACTORY TEST AND INSPECTION

The following tests shall be conducted at the contractor's plant and three certified copies of the test report shall be furnished to the inspecting officer. If the tests meet all requirements of the specification the units so tested will be approved for shipment. The contracting officer shall be notified of readiness for inspection at least 10 days prior to the time of testing. All factory testing and inspecting to assure satisfactory operation of the units shall be witnessed by an authorized representative of the contracting officer. The manufacturer shall provide all necessary equipment, labor and instruments to perform the tests. Inspections may be conducted throughout the fabrication of the units to confirm that the highest quality of workmanship has been maintained and that all conditions of the specification are being met. The contractor shall submit for approval a complete testing procedure to be conducted on the units prior to beginning factory tests. The Government reserves the right to witness all tests unless waived in writing.

7.1 Preliminary Tests - All units will be given individual tests where applicable to assure satisfactory operation of components.

7.1.1 Generator Control and Remote Cabinet - After assembly the generator control and remote cabinet shall be

tested for operation under simulated service conditions to assure the accuracy of the wiring and functioning of the equipment. The main circuits shall be given a dielectric test of 2200 volts for one minute between live parts and ground and between opposite. The wiring of the control circuits shall be given a dielectric test of 1500 volts for one minute between live parts and ground.

7.2 Operational Tests - All testing will be performed at 1800 RPM, 60 cycle operation. Each set will be operated for four hours at 50% rated capacity followed by two hours at 100% rated capacity followed by two hours at 110% rated capacity. The following data will be recorded at 30 min. intervals; ambient temperature, voltage, line current, frequency, power factor, jacket water temperature, fuel pressure, oil pressure. Fuel oil consumption will be calculated in gal/hour for each load. The set shall operate satisfactorily throughout the load test without undue vibration, overheating, or distress and the voltage and frequency shall remain within the specified limits. If any stoppage is necessary the run test shall be repeated beginning at the initial start-up point until an uninterrupted test run is completed in accordance with these requirements.

7.2.1 Assumption Tests - The set will be required to start automatically and assume full rated load as soon as output voltage reaches rated value. Voltage and frequency shall stabilize within 3 seconds from application of load.

7.2.2 Voltage Adjustments - The range of the voltage regulator will be adjusted to assure a range of ± 10% from 208 volts. Unit will be operated at both 1500 and 1800 RPM for this test.

7.2.3 Automatic & Remote Start - The automatic and remote start facility will be tested for proper operation.

7.2.4 Safety Controls - The operation of all safety controls will be tested to assure proper operation.

7.2.5 Run In - At the completion of the above test the unit will be operated continuously for 36 hours at 90% full rated load.

7.2.6 Additional Tests - Additional tests as considered necessary to determine the operation and adequacy of the unit to meet the specification may be required. Such tests will be determined by the inspecting officer.

8. INSTALLATION REQUIREMENTS

Installation of the units will be by others in accordance with construction drawings. The contractor is required to furnish information for proper installation.

9. SPARE PARTS

The contractor will supply spare parts necessary for two years normal operation (10 hours per month). Engine parts will be limited to preventative maintenance items such as filters, strainers, belts, etc. A 100% stock of lamps and fuses will be supplied. The contractor will submit a list of all spare parts he contemplates providing for approval.

10. MANUFACTURER'S NAMEPLATES

Original manufacturer's nameplates or identifying tags will not be altered or removed.

11. INSTRUCTION BOOK AND PARTS LIST

The contractor shall furnish six, contracting officer approved, instruction books per unit. Two books shall be included with each generator set and four copies per set given the inspecting officer. If this book is not available, installation instructions may be used until the complete and approved instruction book is available. Any temporary installation instructions furnished must be replaced with a copy of the complete and final instruction book as soon as it is available. The installation instructions shall be bound into book form and give all the necessary information to put the set into operation. The book shall contain a schematic and connection wiring diagram, piping connections, starting instructions, alignment instructions, voltage and frequency adjustments, and interconnection diagrams. These books shall contain complete instructions on the maintenance and operation of the set, a complete list of all parts, outline drawings giving: installation dimensions, weight, fuel consumption, location of all external connections such as power lines, fuel lines, exhaust line, and control lines; it shall contain photographs or drawings illustrating the parts including the engine details. Each book shall contain the following additional photographs: a left side view and

and right side view of the engine and generator, a front view of the generator control cabinet and views of the interior with the door open. These photographs shall bear reference numbers which may be identified by cross reference to the part list. Accessories may be covered by manufacturer's standard printed illustrative parts bulletin. Usually such bulletins cover all parts of the series of which the accessory is a part, therefore, it will be necessary for the contractor to prefix such bulletins with a list of only those part which comprise the accessory furnished on the set. The engine manufacturers parts book must be coordinated to cover the correct options and accessories as supplied by him on the engine. Complete nameplate data shall be given for all equipment having nameplates. The book shall also contain a complete section relative to alignment of all rotating equipment and hints on servicing which might be of value to mechanics. This should include a listing of parts which require lubrication and servicing on a periodic basis, as well as suggestions to help in diagnosing and correcting minor troubles which might develop. Complete instructions will also be included for the procedure for disassembling and reassembling all parts which require removal for initial installation or during routine maintenance. Complete information on adjustments, contact pressure, dropout and pickup voltage of relays, clearance fits and manufacturers wear tolerances shall be included. This book shall show the

original manufacturers part numbers, in addition to any numbers which the contractor may also assign.

11.1 Arrangement - The instruction book shall be arranged in the following order:

a. Front Cover - The front cover shall contain essentially the manufacturer's description and model number.

b. Table of Contents

c. Pertinent Data - This shall consist essentially of the nameplates data of all major equipment.

d. Illustrations - This will consist of photographs, min. size 4" x 5", and illustrative drawings.

e. General Description - This paragraph shall contain a brief description of the equipment as a whole, including the general mechanical construction and the basic principals upon which the set operates.

f. Installation - The text should cover complete installation instructions and procedures.

g. Theory of Operation - The text of this section shall cover the description of the circuits and describe how they work. (Sequence of operation)

h. Maintenance and Overhaul - This section shall include all information necessary to permit technicians to locate troubles, perform maintenance and make adjustments.

i. Parts List - This section shall contain a complete list of parts with the original manufacturer's

part number as well as any numbers assigned by the contractor.

j. Drawings - Include wiring diagrams, etc.

k. Guarantee - The contractual guarantee clause covering the equipment shall be incorporated.

12. PACKING AND CRATING

The bidder will submit a separate proposal for packing in accordance with the attached packing specifications.

13. ERRORS AND OMISSION

The contractor will not be allowed to take advantage of any errors or omissions in the specifications discovered after award and full instructions will be given by the contracting officer should any errors or omissions be discovered.

14. GUARANTEE

All equipment shall be guaranteed against defective materials, design and workmanship for a period of one year from date of final acceptance. Upon receipt of notice from the Government of failure of any part during the guarantee period, the affected part or parts shall be replaced promptly with new parts by and at the expense of the manufacturer. Return of the damaged item will be at the discretion of the contracting officer or his agent.

Next 9 Page(s) In Document Exempt

ROUTING AND RECORD SHEET

25X1A

SUBJECT: (Optional) [redacted] SUB VII

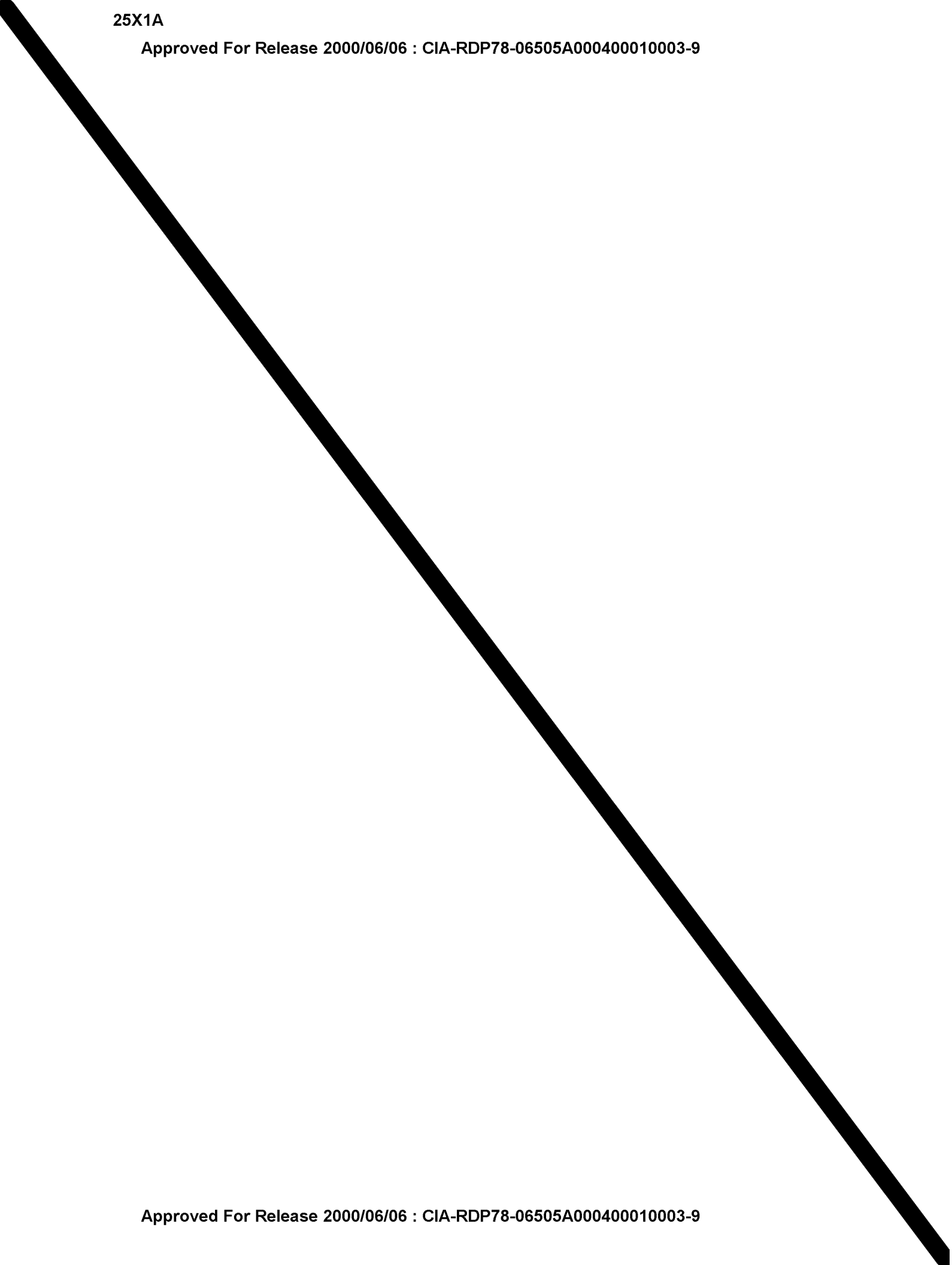
17-68

FROM:	EXTENSION	NO.
Chief, Real Estate and Construction Division, OL	3017	Sub VII
		DATE

TO: (Officer designation, room number, and building)	DATE RECEIVED	DATE FORWARDED	OFFICER'S INITIALS	COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)
1. EO/RECD/OL 906 Ames		11/15	ZAM	
2.				
3. OC-E 806 Ames		11/15	JM	COORDINATION
4. OC-ASD 2D-0107 Headquarters		11/15	FRANK KENNEY JM	COORDINATION (TEL-CON)
5.				
6. EO/RECD/OL 906 Ames		11/15	ZAM	
7. C/RECD/OL 906 Ames		11/15	K	SIGNATURE
8.				
9. OL/RECD/EB 905 Ames				HANDCARRY
10. [redacted]				
11.				
12.				
13.				
14.				
15.				OL 8 7693

25X1A

FORM 3-62 610 USE PREVIOUS EDITIONS



Approved For Release 2000/06/06 : CIA-RDP78-06505A000400010003-9